

October 31, 2005

MEMORANDUM FOR: Galen Scott  
NGS COASTAL Team Leader

FROM: David B. Zilkoski  
Acting Director

SUBJECT: INSTRUCTIONS: Blackwater National Wildlife  
Refuge Height Modernization Project  
Task Number: C8K6DNSP00

GENERAL:

NGS will conduct a height modernization survey to determine high accuracy elevations for bench marks, tide stations, stream gauges and Surface Elevation Tables (SETs) in and around Blackwater NWR, Dorchester County, Maryland. GPS observations performed in cooperation with the Center for Operational Oceanographic Products and Services (CO-OPS), U.S. Geological Survey (USGS), and U.S. Fish and Wildlife Service (FWS) and the National Aquarium in Baltimore (NAIB) will provide a consistent height reference system to enable the integration of observing systems from several agencies, increasing the value of all of the observations by making them comparable to each other.

PURPOSE:

The Blackwater region is very flat and has many tidal and non-tidal hydrologic inputs. Land subsidence, sea level rise, invasive species, and changing land use in the surrounding area have contributed to the loss of over 6,000 acres of tidal salt marsh since the refuge opened in 1933. Restoring these wetlands is a major undertaking, made more critical by rapidly increasing development in the area. Determining water flow in such a flat area requires a common vertical reference system and high accuracy elevation measurements.

NGS' role in supporting the construction and monitoring phases of ongoing restoration efforts in Blackwater NWR includes the following:

- Provide a geodetic control workshop for federal partners.
- Conduct reconnaissance to identify existing GPSable benchmarks.
- Install 9 each deep rod foundations for SETs.
- Set 6 each new bench marks near remote water level gages or SETs.

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PROJECT INSTRUCTIONS WITH MAP

- Perform a height modernization survey on approximately 30 stations. See attached station list.

These NGS efforts will be supplemented by ongoing work at CO-OPS (under separate instructions):

- Establish local tidal datum elevations for the region using available historical information and four operating tide gauges including the National Water Level Observation Network (NWLON) station in Cambridge, MD.
- Estimate the long-term sea level trends and variations at the marsh site using the closest long-term NWLON station
- Analyze the frequency of high waters relative to the present marsh surface and the duration that the marsh surface is inundated due to the elevations of high waters.

Collectively, these tasks directly support the integration of data from various observing systems currently run by NOAA, USGS, and the US Army Corps of Engineers.

#### GPS SPECIFICATIONS:

General specifications for the project are given in [NOS NGS-58: Guidelines for Establishing GPS-Derived Ellipsoid Heights](#).

#### GPS DATA ACQUISITION:

NGS will be collaborating with Tom Reiss and his USGS survey team from Menlo Park, CA. Receivers and personnel from both agencies will be used.

#### USGS GPS Units:

- 7 each Ashtech Z-Extreme receivers
- 3 each Ashtech Z-12 receivers

#### NGS GPS Units:

##### Silver Spring

##### OAD

- 4 each Trimble 5700 receivers
- 2 each Trimble 4000 receivers
- 1 each Ashtech Z-Extreme receiver

##### RSD

- 2 each Ashtech Z-Max receivers

##### Corbin

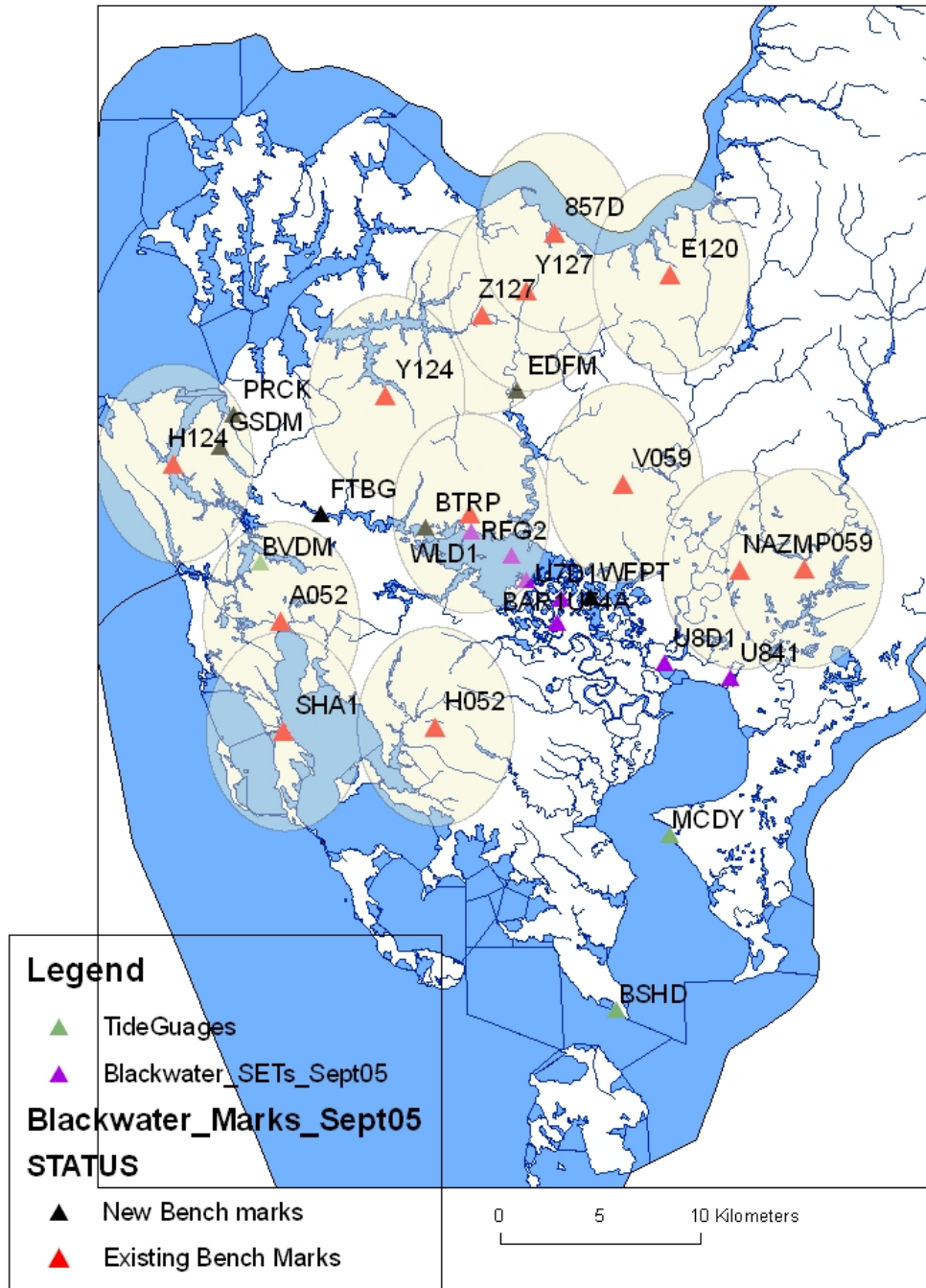
- 8 Ashtech Z-Extreme receivers

##### Norfolk

- 5 each Ashtech Z-Extreme receivers
- 2 each Trimble 4000 receivers

Data collection shall be accomplished at 15-second epoch intervals referred to the minute. Track satellites down to a 10-degree elevation angle. Take photographs of the site layout, reference stations, and any unusual situations.

## Blackwater Height Mod Survey



Personnel responsibilities from NGS Project Proposal form:

Principal investigator: Galen Scott

- Maintain files
- Write report on research findings
- Prepare project instructions
- Write the project report
- Prepare the Blue Book files
- Prepare outreach materials and presentations
- Perform marketing activities

Perform needed research:	Joe Evjen, Bob Leonard, & Galen Scott
Write Travel Orders:	Annie McCrary
Logistics coordination for survey:	Don Cahoon (USGS) & Dixie Birch (USFWS)
Perform GPS observations:	See attached Observer List
Prepare the descriptions:	Jeff Olsen
Process and bluebook observations:	Rick Foote
Analyze and adjust the data:	Rick Foote & Jeff Olsen
Report out from Workshop:	Ruth Osborne

EXPENSES:

Travel expenses for this project will be charged to Task Number C8K6DNSP00.

TRAVEL:

Travel and per diem are authorized in accordance with Federal Travel Regulations, Part 301-11, Per Diem Allowances. Current per diem rates are effective for FY05.

CONTACT INFORMATION:

NGS:

Galen Scott, NGS COASTAL Team Lead  
 Project Development Branch  
 Spatial Reference System Division  
 N/NGS21, SSMC3, Station 8858  
 1315 East-West Highway  
 Silver Spring, MD 20910-3282  
 Telephone: 301-713-3198, ext. 131  
 Fax: 301-713-4324  
 E-Mail: galen.scott@noaa.gov

CO-OPS:

Kristen A. Tronvig, COASTAL coordinator  
 NOAA/NOS/Center for Operational  
 Oceanographic Products and Services

N/OPS3, SSMC4, Station 7331  
1305 East West Highway  
Silver Spring, MD 20910  
Telephone: 301-713-2877 x155  
Cell: 301-518-7293  
Fax: 301-713-4437

USFWS:

Dixie L. Birch, Ph.D.  
Supervisory Wildlife Biologist  
Chesapeake Marshlands National Wildlife Refuge Complex  
2145 Key Wallace Drive  
Cambridge, MD 21613  
Telephone: 410-228-2692, ext. 118  
Fax: 410-228-3261  
E-mail: [dixie\\_birch@fws.gov](mailto:dixie_birch@fws.gov)

USGS:

Donald R. Cahoon, PhD  
U.S. Geological Survey, Patuxent Wildlife Research Center,  
10300 Baltimore Avenue, BARC-East, Bldg 308  
Beltsville, MD 20705  
Telephone: 301-497-5523  
Fax: 301-497-5624  
E-mail: [don\\_cahoon@usgs.gov](mailto:don_cahoon@usgs.gov)  
Website: <http://www.pwrc.usgs.gov/set>

Thomas E. Reiss  
U.S. Geological Survey  
599 Seaport Blvd.  
Redwood City, CA 94063  
Telephone: 650-329-5087  
Cell: 408-603-3030  
Fax: 650-365-9841  
E-mail: [treiss@usgs.gov](mailto:treiss@usgs.gov)

cc: N/NGS – D. Zilkoski  
N/NGS – S. Watkins (first page only)  
N/NGS – R. Osborne  
N/NGS1 – G. Mitchell  
N/NGS21 – J. Evjen  
N/NGS21 – C. Craig (first page only)  
N/NGS21 – F. Maida  
N/NGS22 – R. Foote  
N/NGS22 – B. Leonard  
N/NGS4 – E. Wade  
N/NGS4 – D. Hoar  
N/NGS4 – M. Vorhauer  
N/NGS4 – J. Olsen  
N/NGS41 – M. Eckl  
FGCS MEMBERS (first page only)  
Steve Kopecky - USACE  
Dan Sain MD - SHA  
David Nemerson – NAIB  
Don Cahoon – USGS  
Dixie Birch - USFWS